

REMARKS

Claims 1-20 are pending in the present application. Claims 1-11 have been amended. Claims 12-20 have been withdrawn as being directed to a non-elected invention. Applicants reserve the right to prosecute claims 12-20 in a divisional patent application.

Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the remarks appearing below.

Rejection Under 35 U.S.C. § 102***Miwa***

The Examiner has rejected claims 1-11 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,352,617 to Miwa, stating that Miwa discloses a bipolar device having all of the limitations of these claims. Applicants respectfully disagree.

Independent claim 1, as amended, requires among other things: 1) an undoped epitaxial layer above the substrate and at least above the collector; 2) an emitter having a lower portion confronting the undoped epitaxial layer; 3) a doped epitaxial extrinsic base layer confronting the undoped epitaxial layer; and 4) a doped epitaxial extrinsic base layer containing a conductor ring formed therein surrounding the lower portion of the emitter.

The Miwa bipolar device, on the other hand, does not include any of these features. In general, this is so because the Miwa bipolar device is made using a series of steps much different from the series of steps used to make the bipolar device of amended claim 1. Regarding item 1 in the immediately preceding paragraph, the Miwa device simply does not have an intentionally undoped epitaxial layer over at least the collector. The absence of this layer is seen in any one of the sets of Miwa's figures. Again, Miwa utilizes a method that does not include growing such an undoped epitaxial layer. Consequently, the Miwa bipolar device also does not have an emitter having a lower portion confronting such an undoped epitaxial layer as indicated in item 2 above, nor does the Miwa device have a doped epitaxial extrinsic base layer confronting the undoped epitaxial layer as indicated in item 3 above.

Regarding the doped epitaxial extrinsic base layer of amended claim 1, the Miwa bipolar device does not include such an epitaxial layer. Rather, the Miwa device includes a conductive layer (labeled "23" in FIG. 1F and "84" in FIG. 3F) of "high-melting metal" or "high-melting metallic compound, e.g., WSi_x ," formed by a CVD process on a polysilicon layer. Col. 5, lines 35-38, see also col. 2, lines 14-17. This conductive layer is not an epitaxial layer. In

addition, amended claim 1 requires that a conductor ring be formed in the epitaxial extrinsic base layer. In the Miwa device, the entire conductive layer is made by depositing only a conductive material. Consequently, there is no "formed in" aspect to the Miwa conductive layer. In the device of amended claim 1, on the other hand, the epitaxial layer is first deposited, and then, e.g., the conductor ring is formed in the epitaxial layer, giving the conductor ring this "formed in" character.

Regarding independent claim 7, this claim as amended includes many of the limitations of amended independent claim 1. Consequently, claim 7 is patentable over the Miwa patent for many of the same reasons that claim 1 is patentable over the Miwa patent.

Regarding dependent claims 2-6 and 8-11, each of these claims is patentable over the Miwa patent as depending from either amended claim 1 or 7, each of which is patentable over the Miwa patent for the reasons discussed above. In addition, dependent claims 2-6 and 8-11 include limitations not disclosed or suggested by Miwa, either explicitly or inherently. See, e.g., amended dependent claims 4 and 9, which each require that the conductor ring comprise a silicidated region of the doped epitaxial extrinsic base layer. Amended dependent claim 5 requires that the conductor ring have a thickness that is less than the thickness of the doped epitaxial extrinsic base layer. Amended dependent claims 6 and 10 each require a landing pad remnant. Amended claim 11 further requires a nitride spacer located on top of the landing pad. Miwa is completely silent on these limitations of the amended dependent claims.

For at least the foregoing reasons, Applicants respectfully request that the Examiner withdraw the present anticipation rejection.

Haramé et al.

The Examiner has rejected claims 1-3, 5, 7, 8 and 10 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,024,957 to Haramé et al., stating that Haramé et al. disclose a bipolar device having all of the limitations of these claims. Applicants respectfully disagree.

The claimed device of each of amended independent claims 1 and 7 is patentable over the Haramé et al. bipolar device for the same reason that the claimed device is patentable over the Miwa bipolar device. That is, the Haramé et al. bipolar device does not include many of the limitations of the device of each of amended claims 1 and 7 because it is made by a process that is much different from the process used to make the claimed device.

Again, amended independent claim 1 requires among other things: 1) an undoped epitaxial layer above the substrate and at least above the collector; 2) an emitter having a lower portion confronting the undoped epitaxial layer; 3) a doped epitaxial extrinsic base layer confronting the undoped epitaxial layer; and 4) a doped epitaxial extrinsic base layer containing a conductor ring formed therein surrounding the lower portion of the emitter.

Regarding item 1 in the immediately preceding paragraph, the Harame et al. bipolar device simply does not have an intentionally undoped epitaxial layer over at least the collector. The absence of this layer is seen in any of the Harame et al. figures. Since the Harame et al. device does not include such an undoped epitaxial layer, the Harame et al. bipolar device, *a fortiori*, does not have an emitter having a lower portion confronting such an undoped epitaxial layer as indicated in item 2 above, nor does the Harame et al. device have a doped epitaxial extrinsic base layer confronting the undoped epitaxial layer as indicated in item 3 above.

Regarding the doped epitaxial extrinsic base layer of amended claim 1, the Harame bipolar device does not include such an epitaxial layer. Rather, the Miwa device includes a conductive layer (labeled "24" in FIGS. 1A and 2-9) of "highly doped polysilicon, polycide, or a refractory metal" formed on an insulating layer. Col. 3, lines 63-66. This conductive layer is not an epitaxial layer. In addition, amended claim 1 requires that a conductor ring be formed in the epitaxial extrinsic base layer. In the Harame et al. device, the entire conductive layer is made by depositing only a conductive material. Consequently, there is no "formed in" aspect to the Harame et al. conductive layer. In the device of amended claim 1, on the other hand, the epitaxial layer is first deposited, and then, e.g., the conductor ring is formed in the epitaxial layer, giving the conductor ring this "formed in" character.

Regarding independent claim 7, this claim as amended includes many of the limitations of amended independent claim 1. Consequently, claim 7 is patentable over the Harame et al. patent for many of the same reasons that claim 1 is patentable over the Harame et al. patent.

Regarding dependent claims 2-6 and 8-11, each of these claims is patentable over the Harame et al. patent as depending from either amended claim 1 or 7, each of which is patentable over the Miwa patent for the reasons discussed above. In addition, dependent claims 2-6 and 8-11 include limitations not disclosed or suggested by Miwa, either explicitly or inherently. See, e.g., amended dependent claims 4 and 9, which each require that the conductor ring comprise a silicidated region of the doped epitaxial extrinsic base layer. Amended dependent claim 5

requires that the conductor ring have a thickness that is less than the thickness of the doped epitaxial extrinsic base layer. Amended dependent claims 6 and 10 each require a landing pad remnant. Amended claim 11 further requires a nitride spacer located on top of the landing pad. Miwa is completely silent on these limitations of the amended dependent claims.

For at least the foregoing reasons, Applicants respectfully request that the Examiner withdraw the present anticipation rejection.

Rejection Under 35 U.S.C. § 103

The Examiner has rejected claims 4, 6, 9 and 11 under 35 U.S.C. § 103 as being obvious in view of the Harame et al. patent, above, and ordinary skill in the art, stating that Harame et al. disclose all of the limitations of these claims except a conductive layer comprising a silicide. The Examiner then asserts that it would have been obvious to a person having ordinary skill in the art at the time of the invention to substitute the polysilicon of layer 24 with a silicide. Applicants respectfully disagree.

Amended dependent claims 4, 6, 9 and 11 are patentable over the Harame et al. patent for at least the reason that they depend from either independent claim 1 or independent claim 7, each of which, as amended, is patentable over the Harame et al. patent for at least the reasons discussed above relative to the anticipation rejection in view of the Harame et al. patent.

For at least this reason, Applicants respectfully request that the Examiner withdraw the present obviousness-type rejection.

CONCLUSION

In view of the foregoing, Applicants submit that claims 1-11, as amended, are in condition for allowance. Therefore, prompt issuance of a Notice of Allowance is respectfully solicited. If any issues remain, the Examiner is encouraged to call the undersigned attorney at the number listed below.

Respectfully submitted,

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